# Interim Geologic Map of the Eastern Half of the Salina 30' x 60' Quadrangle, Emery, Sevier, and Wayne Counties, Utah

**by**
**Hellmut H. Doelling**[1]

**October 2004**

[1] Utah Geological Survey, P.O. Box 146100, Salt Lake City, UT 84114-6100.

**Utah Geological Survey Open-File Report 438**

**Utah Geological Survey**
*a division of*
**Utah Department of Natural Resources**

This geologic map was funded by the Utah Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program through USGS STATEMAP award numbers 02HQAG0055 and 03HQAG0096. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S Government.

**Description of Map Units**
**Interim Geologic Map of the Eastern Half of the Salina 30' x 60' Quadrangle**

## QUATERNARY-TERTIARY DEPOSITS

Qa, $Qa_1$, $Qa_2$ **Stream and wash alluvial deposits**: Sand, silt, clay, granules, pebbles, and sparse cobbles adjacent to more active streams and washes; unconsolidated, poorly to well-sorted channel-fill deposits. $Qa_1$ is locally differentiated along active drainages, while $Qa_2$ is locally mapped above active drainages. Mapped as Qa where $Qa_1$ and $Qa_2$ are determined to be too thin to differentiate at this scale. Thickness varies widely, but commonly less than 10 meters (30 ft) thick. Holocene to late Pleistocene.

Qam **Alluvial mud and slope wash deposits:** Light- to dark-gray clay, mud, silt, sand, granules, and pebbles that are faintly cross-bedded; an assemblage of alluvial, alluvial mud, alluvial fan, and terrace deposits that form broad gently sloping sheets. Thickness ranges to 8 meters (25 ft). Holocene to late Pleistocene.

Qaf **Alluvial-fan deposits**: Poorly sorted, angular to subrounded gravel, containing cobbles and sparse boulders, in crudely bedded to unstratified granules, sand, silt, and clay matrix; cut-and-fill channel features locally present; deposited at the foot of cliffs and higher outcrops, and at the mouths of streams and washes. Thickness commonly less than 15 meters (50 ft). Holocene to late Pleistocene.

Qat **Terrace alluvium**: Silt to cobbles, angular to rounded; contains chert, limestone, sandstone, siltstone, conglomerate, dolomite, and igneous lava boulders to 0.6 m (2 ft) or more in diameter, but mostly pebbles to cobbles up to 5 centimeters (2 in) in diameter; poorly to well sorted; basal parts are generally more coarse; commonly partly to well consolidated in basal parts with cementing calcium carbonate (caliche), especially in the higher deposits; cement is locally as thick as 3.5 meters (12 ft); deposits are found at irregular levels above modern drainages. 0 to 10 meters (0-30 ft) thick. Holocene and Pleistocene.

Qap **Pediment-mantle deposits**: Poorly to moderately sorted, rounded to angular boulders, cobbles, pebbles, granules, sand, silt, and clay, generally becoming less coarse upward; covers bedrock surfaces between drainages at various levels above local base level. Commonly less than 15 meters thick (50 m). Mostly Pleistocene.

Qapv **Pediment-mantle deposits**: Similar to Qap deposits, but contain significant quantities of rounded vesicular basalt boulders. Covers bedrock surfaces between drainages at various levels above local base level. More than one Qapv deposit may share a common boundary. Commonly less than 15 meters thick (50 feet). Mostly Pleistocene, locally Holocene.

QTap **Pediment-mantle deposits**: Similar to Qap deposits, but contain large angular white boulders of the Flagstaff Limestone as exposed at the top of the Wasatch Plateau. Commonly less than 15 meters thick (50 feet). Probably Pleistocene and Pliocene.

Qac **Mixed alluvial and colluvial deposits**: Very poorly sorted angular boulders, cobbles, in narrow canyons and gulches derived from the canyon walls, mixed with sand, silt, and clay carried in by the modern drainage. Variable thickness. Holocene.

Qmt **Talus and colluvium**: Rock-fall blocks, boulders, smaller angular gravel, sand, and silt; deposited on slopes and below cliffs and steep slopes; only larger deposits mapped. Thickness generally 6 meters (20 ft) or less. Holocene to late Pleistocene.

Qms **Landslide and slump deposits**: Coherent to broken and jumbled masses of bedrock that have moved downslope due to gravity; most commonly associated with steep slopes of Mancos Shale. Varied thicknesses. Holocene to late Pleistocene.

Qmb **Bouldery deposits**: Angular to subrounded boulders, cobbles in a matrix of gravel, silt and clay particles all derived from Tertiary sill and dike complexes. Thickness generally 6 meters (20 ft) or less. Holocene to late Pleistocene.

Qmrl **Residual limestone deposits**: Mostly angular boulders of Flagstaff Limestone mostly lodged on the Price River Formation in the northwest part of the quadrangle; probably represent landslide and slump deposits wherein most fine constituents have been removed by wind and water. Pleistocene.

Qea **Mixed wind-blown sand and alluvium**: Sand and silt of eolian origin interspersed with silt, sand, and gravel of fluvial origin; generally dominated by eolian deposits; commonly displays a well-developed caliche soil horizon at the top. Thickness 15 meters (50 ft) or less. Holocene to middle Pleistocene.

Qes **Wind-blown sand**: Unconsolidated sand deposited in sheets, nearly white to light-brown, but generally light orange-brown or tan, fine to medium grained, well sorted; especially common in areas underlain with Jurassic Entrada and other sandstone deposits. 0 to 5 meters (0-15 ft) thick. Holocene.

Ql **Lacustrine deposits**: Deposits associated with modern lakes. Thickness unknown, likely exceeds 3 meters (10 ft) thick. Holocene.

## IGNEOUS ROCKS

Ts **Tephrite, phonotephrite, and trachybasalt sills and flows**: Light-gray to dark-green-gray sills, commonly differentiated into tephrite and phonotephrite horizons and exhibiting a chilled zone at the contacts with the sedimentary rocks into which they are intruded (described as composite sills of syenite and diabase by Williams and Hackman,

1971); locally porphyritic with phenocrysts of olivine, biotite, basaltic hornblende and feldspar in a groundmass of anorthoclase, labradorite, hornblende, analcite, and thomsonite; resistant and commonly found intruded into several sedimentary horizons from a feather edge to nearly 30 meters (100 ft) in thickness; sills locally split and divide; mostly intruded into Middle Jurassic rocks. Early Pliocene; two $^{40}Ar/^{39}Ar$ dates obtained from these sills yielded 4.35±0.04 Ma and 4.49±0.08 Ma, from Mussentuchit Wash (NE sec. 36, T. 24 S., R. 6 E.) and Hebes Mountain (SE sec. 27, T. 24 S., R. 7 E.), respectively.

Td **Trachybasalt and basalt dikes**: Dark-gray to dark-green-gray dikes, consisting chiefly of augite, biotite, labradorite, anorthoclase, olivine, thomsonite, and analcite (diabase dikes by Williams and Hackman, (1971); mostly nearly vertical and appear to cut sills (Ts), but are probably related to them; intruded into sedimentary rocks of Late Jurassic to Triassic age, some are as much as 4.8 km (3 miles) in length. 0 to 3 meters (0-10 ft) thick. Early Pliocene; Nelson (1989) reports on three K/Ar dates ranging from 3.8 to 5.4 Ma.

Tv **Interbedded trachyte lava flows and volcanic conglomerate**: Red to gray, highly jointed, weakly porphyritic flows interbedded with volcanic pebbles and cobbles; flow rock contains 2% plagioclase phenocrysts (up to 5 mm in diameter) and minor clinopyroxene, orthopyroxene, and cubic iron-titanium oxide in a groundmass of iron-titanium oxides interspersed among alkali feldspar laths and quartz. Mapped by Nelson (1989) near Geyser Peak. Unit is 45-120 meters (150-400 ft) thick. Late Oligocene.

Tr **Shoshonite lava flows**: Poorly exposed red to gray porphyritic flows consisting of about 35 percent phenocrysts of plagioclase, augite, olivine, iron-titanium oxide, and trace amounts of orthopyroxene in a matrix of olivine, iron titanium oxides, plagioclase, and glass or sanidine. Mapped by Nelson (1989) near Riley Spring and Geyser Peak. Thickness is 60-90 meters (200-300 ft) thick. Oligocene.

## SEDIMENTARY ROCKS

### TERTIARY ROCKS

Tcs **Conglomerate, limestone, and sand**: Massive pebble conglomerate of multicolored chert, overlain by crystalline lacustrine limestone, in turn overlain by unconsolidated medium- to coarse-grained sand. About 60 meters (200 ft) are exposed in southwest corner of map area near Geyser Peak. Unit has not been correlated to named formations, but is tentatively thought to belong within the Paleocene to Oligocene interval.

Tfu, Tfl **Flagstaff Limestone:** Limestone, white, light gray, yellow gray, and light brown; thin to thick bedded and locally massive, dense, and mostly fine grained crystalline; has some algal nodules and local oncolites; contains subordinate gray shale; largely a lacustrine deposit, forms resistant ledges and cliffs. Divided into Tfu (upper member) where outcrops are more blocky and bedding is distinct, and into Tfl (lower member) where

outcrops are less blocky and the bedding is not as prominent as on White Mountain. 60 to 335 meters (200-1,100 ft) thick. Paleocene.

TERTIARY AND CRETACEOUS ROCKS

TKnh **North Horn Formation**: Variegated shale, sandstone, and limestone; shale is light red or purple, gray green or light gray; sandstone is brown, gray, or yellow gray; and limestone is very light gray or yellow gray; also contains local conglomerate beds with pebbles of chert and quartzite; bedding is thin to massive, but limestones are generally thin bedded; generally forms steep slopes with local ledges; locally prone to landsliding. 150 to 320 meters (500-1050 ft). Paleocene to Late Cretaceous.

CRETACEOUS ROCKS

Kpr **Price River Formation**: Mostly brown, fine- to coarse-grained fluvial sandstone, thin-bedded to massive, with partings of gray sandy carbonaceous shale; resistant and blocky. Partially exposed in fault block. Mapped as Kpr? where uncertain. 180 to 305 meters (600-1000 ft) thick. Late Cretaceous (Campanian).

Kc **Castlegate Sandstone**: Sandstone, gray, white, weathers gray orange, medium to coarse grained, locally conglomeratic, thick bedded to massive, resistant, forms cliffs and benches. Mapped as Kc? where uncertain. 30 to 60 meters (100-200 ft) thick. Late Cretaceous (Campanian).

Kbh **Blackhawk Formation**: Yellow-gray, gray, and white fluvial sandstone; fine to coarse grained and locally conglomeratic, interbedded with gray and green sandy carbonaceous shale, gray shale and coal; contains thick, mineable coal beds near the base; forms ledges and steep slopes. About 180 to 260 meters (600-850 ft) thick. Late Cretaceous (Campanian).

Ksp **Star Point Sandstone**: Yellow-gray, light-brown, and white sandstone; fine to medium grained; lower part intertongued with gray shale of the Mancos Shale below; resistant and cliff forming. 30 to 120 meters (100-400 ft) thick. Upper Cretaceous (Campanian).

**Mancos Shale**

Kmu **Mancos Shale uncertain**: Gray marine shales on fault zone, identity unknown.

Kmbu **Upper Blue Gate Member**: Medium to dark-blue-gray marine shale, yellow to blue-gray sandy shale, and yellow-gray fine-grained sandstone; interbedded sandstone increases toward top; forms steep slope beneath the Star Point Sandstone cliff. 90 to 245 meters (300-800 ft) thick. Late Cretaceous (Early Campanian).

Kme **Emery Sandstone Member**: Yellow-gray friable sandstone, fine to medium grained; forms cliffy ledges with minor slopes of sandy gray shale. 120 to 245 meters (400-800 ft) thick, thickening southward. Late Cretaceous (Santonian).

Kmel **Lower ledge of Emery Sandstone Member:** A tongue of the Emery Sandstone in the area north of the town of Emery, about 30 meters (100 ft) below the main member outcrops in the Blue Gate Shale Member. 12 to 25 meters (40-80 ft) thick. Late Cretaceous (Santonian).

Kmb **Blue Gate Member**: Pale blue-gray marine shale, nodular and irregularly bedded mudstone and siltstone with several yellow-gray arenaceous beds; weathers into low rolling hills and badlands. 300 to 490 meters (1,000-1,600 ft) thick. Late Cretaceous (Turonian to Middle Santonian).

Kmf **Ferron Sandstone Member**: Alternating yellow-gray, light-brown, and white sandstone, sandy gray shale, gray and carbonaceous shale, and coal; mostly fine to medium-grained sandstone, commonly calcareous; lenticular thin to massive beds; mostly cliff-forming, especially in lower half; upper part more ledgy; several mineable coal beds. 120 to 215 meters (400-700 ft) thick, thickening to the southwest. Late Cretaceous (Turonian).

Kmt **Tununk Member**: Medium- to dark-gray marine shale; forms steep slope under Ferron Sandstone Member cliff; becomes increasingly sandy toward top. 150 to 245 meters (500-800 ft) thick. Late Cretaceous (Cenomanian and Turonian).

Kd **Dakota Sandstone**: Variable assemblages of yellow-gray sandstone, conglomerate, light-brown shale, and coal; sandstone is generally medium to coarse grained, cross-bedded, thick bedded, and lenticular; conglomerate contains gray quartzite and black chert pebbles up to 5-8 cm (2-3 in) in diameter; coal beds, when present, are generally less than 60 cm (2 ft) thick; forms ledges and slopes. 6 to 35 meters (20-120 ft) thick. Late Cretaceous (Cenomanian).

*unconformity*

Kcm **Cedar Mountain Formation**: Light-lavender and gray shale with subordinate light-gray conglomerate, conglomeratic sandstone, and sandstone; the coarser lenticular constituents are generally present at the base where they form conspicuous ledges or a cliff; upper shales form rounded slopes and hills or steep slopes beneath the cliffy Dakota Sandstone outcrops; lower ledge- or cliff-forming units are missing to the southwest making it difficult to separate the Cedar Mountain Formation from the underlying Brushy Basin Shale Member of the Morrison Formation. 15 to 90 meters (50-300 feet) thick, probably thinning to the southwest. Early Cretaceous (Aptian-Albian).

*K-0 unconformity*

JURASSIC ROCKS

**Morrison Formation**

Jmb **Brushy Basin Member**: Purple to very light-gray or white bentonitic shale, locally variegated; contains interbedded zones of brown limestone nodules, thin white sandstone and conglomerate beds; forms rounded slopes and hills or steep slope beneath lower cliffy portion of Cedar Mountain Formation; where the Cedar Mountain Formation has no basal cliffy part, the shale of the Cedar Mountain forms one continuous slope with the Brushy Basin Member; commonly contains a great deal of chalcedony (jasper-agate) at the base, either in thin to medium beds or as fragmentary angular pieces. 45 to 130 meters (150-425 ft) thick. Late Jurassic.

Jms **Salt Wash Member**: Gray, brown, and white sandstone, conglomeratic sandstone, and conglomerate interbedded with subordinate red siltstone; sandstone fine to coarse grained; forms ledges. 0 to 60 meters (0-200 ft) thick, thin, discontinuous, or missing in the central part of the area. Late Jurassic.

Jmst **Salt Wash and Tidwell Members, undivided**: As mapped in the thin, discontinuous, or missing Salt Wash Member area in the central part of the map. Late Jurassic.

Jmt **Tidwell Member**: Red and red-brown sandstone, siltstone, and shale; forms ledges and slopes, very fine grained to fine grained; lower contact marked by change from red to light-brown beds of the Summerville Formation. 25 to 45 meters (80-150 ft) thick. Late Jurassic.

*J-5 unconformity*

Js **Summerville Formation**: Brown sandstone and siltstone with local thin white beds; fine grained, thin to medium bedded, forms steep slopes. 60 to 120 meters (200-400 ft) thick. Middle Jurassic.

Jct **Curtis Formation**: Light-gray to light-green-gray sandstone, siltstone, and rare conglomerate; mostly medium to coarse grained; upper 5 to 25 meters (15-80 ft) forms ledgy bench-forming slopes, middle 25 to 40 meters (85-130 feet) is resistant and cliff-forming, and the lower 0 to 10 meters (0-30 ft) forms a recess or steep slope beneath the middle cliff. 30 to 75 meters (100-240 ft) thick. Middle Jurassic.

*J-3 unconformity*

Je **Entrada Sandstone**: Red-brown silty sandstone and subordinate siltstone, very fine grained to fine grained; thin bedded to massive; weathers into rounded (sloping), horizontally grooved cliffs: contains a white fine-grained sandstone marker bed (Jem) 100 to 150 feet (30-45 m) below the top. 180 to 275 meters (600-900 ft) thick. Middle Jurassic.

**Carmel Formation:** The combined Carmel Formation thickens to as much as 335 meters (1,100 ft) in the subsurface along the west margin of the mapped area.

Jcb **Banded member**: Interbedded mudstone, siltstone, sandstone, and thin gypsum beds arranged in irregular cyclical fashion, mostly light gray or light brown gray with subordinate red or red-brown bands; many mudstone and siltstone beds are criss-crossed with satin spar gypsum veinlets; forms slopes and gypsum ledges. About 85 meters (275 ft) thick. Middle Jurassic; represents upper part of Winsor Member.

Jcg **Gypsiferous member**: Thick alabaster gypsum beds interbedded with subordinate light gray or red siltstone or fine-grained sandstone beds. 30 to 38 meters (100-125 ft) thick. Middle Jurassic; represents lower part of Winsor Member.

Jcl **Lower member**: Combined Paria River, Crystal Creek, and Co-op Creek Limestone Members. Paria River Member dominated by limestone and calcarenite in thin to medium beds that is platy weathering, and forms ledges and slopes; contains a thick gypsum bed near the base. Crystal Creek Member is gray-pink sandstone that weathers red, forms steep slope, and containing criss-crossings of satin-spar gypsum veinlets. Co-op Creek Limestone Member is mostly ledgy limestone and calcarenite with partings or thin interbeds or partings of siltstone, mudstone or fine-grained calcareous sandstone. Paria River Member 49 to 53 meters (160-175 ft) thick; Crystal Creek Member 8 to 9 meters (25-30 feet) thick; Co-op Creek Limestone Member 9 to 12 meters (30-40 ft) thick; the complete lower member as mapped is therefore 66 to 74 meters (215-245 ft) thick. Middle Jurassic.

Jp **Page Sandstone**: Mostly gray, yellow-brown, or white sandstone, fine to coarse grained, partly cross-bedded, in thick beds, commonly resistant. 0 to 14 meters (0-45 ft) thick. Middle Jurassic.

*J-2 unconformity*

**Navajo Sandstone:** The Navajo Sandstone is mapped as two units and probably thickens to 335 meters (1,100 ft) in the subsurface along the west margin of the mapped area.

Jn **Upper member**: Mostly light-hued, fine- to medium-grained, cross-bedded sandstone in large trough sets, contains a few scattered dark mineral grains; grains are mostly subangular, frosted, and well sorted; clean and friable; mostly calcareous; mostly massive; weathers into domes and rounded knolls. 80 to 135 meters (270-440 ft) thick, increasing from east to west. Early Jurassic.

Jno **Basal member**: Like the upper member, but forms a prominent cliff at the base of the formation. 40 to 60 meters (130-200 ft). Early Jurassic.

Jk **Kayenta Formation**: Lavender, red-brown, and pale-red fine- to coarse-grained sandstone, medium to thick bedded and massive, irregularly bedded and cross-bedded (mostly low-angle) unit; formation is locally bleached to mostly yellow-gray by hydrocarbons; contains thin red-brown shaly siltstone that forms local partings; contains local white and dark-brown beds, intraformational conglomerate, lenses of gritstone, pebble conglomerate, and limestone; many sandstone beds are micaceous; lower contact is a scoured surface in the Wingate Sandstone; forms a series of thick steplike ledges, cliffs, and benches; mostly fluvial, but contains a few eolian beds toward the top. Mostly 45 to 90 meters (150-300 ft) thick. Early Jurassic.

JURASSIC-TRIASSIC ROCKS

JTrw **Wingate Sandstone**: Orange-brown, dark-brown-weathering, fine-grained, massive, eolian, quartzose sandstone; forms vertical cliffs along canyon walls, commonly stained with manganese oxide (desert varnish), formation is locally bleached to mostly yellow-gray by hydrocarbons; local partings of sandy siltstone, more common near the base; generally well cemented with calcium carbonate, but is locally siliceous; contact with unit below is generally abrupt and placed at the base of the Wingate cliff. 75 to 130 meters (240-420 ft) thick. Early Jurassic to Late Triassic.

TRIASSIC ROCKS

**Chinle Formation**:

Trc **Upper member**: Series of green-gray sandstone, micaceous red-brown sandstone, variegated marls, limestone and limestone conglomerates, and maroon shale; all very lenticular and interfingering; sandstone is mostly silty to fine grained, but locally is gritty and pebbly; bedding is thin to medium or indistinct; sandstone locally contains shale pellets and silicified wood; generally overall red brown in upper half and green gray in lower half; cementation is mostly calcareous or argillaceous; forms steep slope interrupted by slight ribs, ledges, and small cliffs; mostly fluvial, locally lacustrine; intertongues with Moss Back Member below. 40 to 80 meters (130-265 ft) thick, thickening north to south. Late Triassic (probably Carnian and Norian).

Trcm **Moss Back Member, Monitor Butte, and Temple Mountain Members, undivided**: Moss Back Member overlies the Monitor Butte and Temple Mountain Members of the Chinle Formation, and locally the Moody Canyon Member of the Moenkopi Formation unconformably; overall gray or gray brown interfingering sequence of cliff- and bench-forming quartzose pebble conglomerate, fine- to medium-grained massive sandstone, limestone pebble conglomerate, fine-grained platy weathering sandstone, and minor gray mudstone; these units interfinger and intergrade; one or more may be locally absent; contains

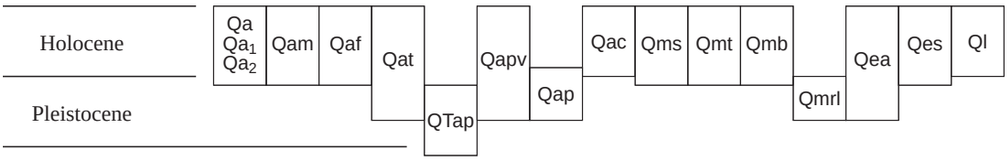
scattered fragments and logs of petrified wood, especially near the top and bottom of unit; contains clay galls, pellets, and carbonized wood near the base, some of which is uraniferous and cupriferous; calcareous cementation; beds are cross-bedded (low angle), lenticular, and, toward the top, platy weathering; fluvial deposit; member thickens where it is channeled into units below. Monitor Butte and Temple Mountain Members unconformably lie beneath the Moss Back Member and locally intergrade and interlens; Monitor Butte contains less massive siltstone beds and lenses of medium- to coarse-grained quartzose sandstone; Temple Mountain consists mostly of mottled (mostly purple, white, and yellow) indistinct to massive siltstone and sandstone (paleosols); combined lower member is 0 to 170 feet (0-52 m); Moss Back is 0 to 45 meters (0-150 ft) thick; Monitor Butte and Temple Mountain Members are 0 to 20 meters (0-66 ft) thick. Late Triassic (Carnian).

*Tr-3 unconformity*

**Moenkopi Formation**:

Trmm **Moody Canyon Member**: Red-brown, chocolate-brown, fine-grained sandstone and siltstone; in even thin beds with local medium beds; forms steep slope with subtle ribs and a few ledges near the top; gradational and intertonguing with Torrey Member below; locally contains thin veinlets of cross-cutting satin-spar gypsum. 43-76 meters (140-250 ft) thick. Scythian and Anisian (Early and Middle Triassic).

**CORRELATION OF MAP UNITS**
111°30' W. Longitude and 38°30' to 39°00' N. Latitude
Emery, Sevier, and Wayne Counties, Utah




| | | | |
|---|---|---|---|
| | Ts | Td | Tephrite, phonotephrite, trachybasalt sills, and flows (Ts) and trachybasalt and basalt dikes (Td) |
| | Tv | | Interbedded trachyte flows and volcanic conglomerate |
| Tertiary | Tr | | Shoshonite lava flows |
| | Tcs | | Conglomerate, limestone, sand |
| | | | Flagstaff Limestone |
| | Tfu | | Upper Member |
| | Tfl | | Lower Member |
| | TKnh | | North Horn Formation |
| | Kpr | | Price River Formation |
| | Kc | | Castlegate Sandstone |
| | Kbh | | Blackhawk Formation |
| | Ksp | | Star Point Sandstone |
| | | | Mancos Shale |
| Upper Cretaceous | Kmu | | Uncertain |
| | Kmbu | | Upper Blue Gate Member |
| | Kme<br>Kmel | | Emery Sandstone Member<br>Lower ledge of Emery Ss |
| | Kmb | | Blue Gate Member |
| | Kmf | | Ferron Sandstone Member |
| | Kmt | | Tununk Member |
| | Kd | | Dakota Sandstone |
| | *unconformity* | | |
| Lower Cretaceous | Kcm | | Cedar Mountain Formation |
| | *K-0 unconformity* | | |
| | | | Morrison Formation |
| Upper Jurassic | Jmb | | Brushy Basin Member |
| | Jms | Jmst | Salt Wash Member |
| | Jmt | | Tidwell Member |
| | *J-5 unconformity* | | |
| Middle Jurassic | Js | | Summerville Formation |
| | Jct | | Curtis Formation |
| | *J-3 unconformity* | | |
| | Je<br>Jem | | Entrada Sandstone |
| | | | Carmel Formation |
| Middle Jurassic | Jcb | | Banded member |
| | Jcg | | Gypsiferous member |
| | Jcl | | Lower member |
| | Jp | | Page Sandstone |
| | *J-2 unconformity* | | |
| | | | Navajo Sandstone |
| Lower Jurassic | Jn | | Upper member |
| | Jno | | Lower member |
| | Jk | | Kayenta Formation |
| | JTRW | | Wingate Sandstone |
| | | | Chinle Formation |
| Upper Triassic | TRC | | Upper member |
| | TRcm | | Moss Back, Monitor Butte, Temple Mountain Members, undivided |
| | *TR-3 unconformity* | | |
| Lower and Middle Triassic | | | Moenkopi Formation |
| | TRmm | | Moody Canyon Member |

**Bibliography of Previous Geologic Maps of the East Half of the Salina 30'x60' Quadrangle, Emery County, Utah**

(used as references only; all mapping is new for this project)


1. Bennett, H.S., Jr., 1955, Photogeologic map of the Emery-7 quadrangle (Mesa Butte), Emery County, Utah, U.S. Geological Survey Miscellaneous Geologic Investigations Map I-10, scale 1:24,000.
2. Bennett, H.S., Jr., 1955, Photogeologic map of the Emery-10 quadrangle (Mussentuchit Flat), Emery County, Utah, U.S. Geological Survey Miscellaneous Geologic Investigations Map I-11, scale 1:24,000.
3. Bunnag, Din, and Moustafa, Galal-el-Din, 1957, Photogeologic map of the Emery-15 quadrangle, (Salvation Creek) Emery County, Utah, U.S.Geological Survey Miscellaneous Geologic Investigations Map I-261, scale 1:24,000.
4. Condon, W.H., 1953a, Photogeologic map of the Emery-16 quadrangle (The Frying Pan), Emery County, Utah, U.S. Geological Survey open-file map, scale 1:24,000.
5. Condon, W.H., 1953b, Photogeologic map of the Emery-9 quadrangle (Ireland Mesa), Emery County, Utah, U.S. Geological Survey open-file map, scale 1:24,000.
6. Condon, W.H., 1956, Photogeologic map of the Emery-8 quadrangle (Big Bend Draw), Emery County, Utah, U.S. Geological Survey Miscellaneous Geologic Investigations Map I-177, scale 1:24,000.
7. Detterman, J.S., 1955, Photogeologic map of the Emery -2 quadrangle (Emery East), Emery County, Utah: U.S. Geological Survey Miscellaneous Investigations Map I-177, scale 1:24,000.
8. Doelling, H.H., 1972a, Wasatch Plateau coal field, in Central Utah coal fields: Utah Geological and Mineralogical Survey Monograph Series No. 3, p. 58-243, includes 1:42,240 scale geologic maps of Acord Lakes NE (Emery West), Acord Lakes NW (Acord Lakes), Acord Lakes SW (Old Woman Plateau), and Emery 3 NW (Johns Peak) quadrangles.
9. Doelling, H.H., 1972b, Emery coal field, in Central Utah coal fields: Utah Geological and Mineralogical Survey Monograph Series No. 3, p. 416-496; includes 1:42,240 scale geologic maps of Emery 1 NE (Short Canyon), Emery East, Mesa Butte, Acord Lakes SE (Walker Flat), Emery 3 NE (Willow Springs Canyon), Emery 3 NW (Johns Peak), and Emery 3 SW (Geyser Peak) quadrangles.
10. Gilluly, James, and Reeside, J.B., Jr., 1928, Sedimentary rocks of the San Rafael Swell and some adjacent areas in eastern Utah: U.S. Geological Survey Professional Paper 150-D, p, 61-110.
11. Lupton, C.T., 1916, Geology and coal resources of Castle Valley in Carbon, Emery, and Sevier Counties, Utah: U.S. Geological Survey bulletin 628, plates 10 and 12, scale 1:62,500.
12. Nelson, S.T., 1989, Geologic map of the Geyser Peak quadrangle, Wayne and Sevier Counties, Utah: Utah Geological and Mineral Survey Map 114, scale 1:24,000, 18 p.
13. Orkild, P.P., 1956, Photogeologic map of the Emery-1 quadrangle (Short Canyon), Emery County, Utah, U.S. Geological Survey Miscellaneous Geologic Investigations Map I-166, scale 1:24,000.
14. Spieker, E.M., 1931, The Wasatch Plateau coal field, Utah: U.S. Geological Survey Bulletin 819, plates 32 and 33, scale 1:62,500.
15. Stokes, W.L., and Cohenour, R.E., 1956, Geologic atlas of Utah, Emery County: Utah Geological and Mineralogical Survey Bulletin 52, 92p., scale 1:125,000.
16. Williams, P.L., and Hackman, R.J., 1971, Geology, structure, and uranium deposits of the Salina quadrangle, Utah: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-591, scale 1:250,000.

# Interim Geologic Map of the

# East Half of the Salina 30' x 60' Quadrangle, Emery, Sevier and Wayne Counties Utah

by Hellmut H. Doelling

2004

Open-File Report 438

Utah Geological Survey
a division of
Utah Department of Natural Resources

UTAH GEOLOGICAL SURVEY

Key to Map Symbols

- Contact - dashed where approximately located (black on colored plot)
- High angle normal fault - dashed where approximately located; dotted where concealed; ball and bar on down-thrown side (black on colored plot); solid and dashed include concealed faults in some areas where contact and fault are in nearly same place
- Anticline - dashed where approximately located; dotted where concealed; arrow shows direction of plunge (red on colored plot)
- Syncline - dashed where approximately located; dotted where concealed; arrow shows direction of plunge (red on colored plot)
- Monocline - dashed where approximately located; dotted where concealed; arrow shows direction of plunge (red on colored plot)
- Igneous dike (Td) or sill (Ts) - dashed where approximately located (purple on colored plot)
- Marker bed
- Major coal seam - dashed where approximately located (orange on colored plot)
- Gravel or road fill excavation - pit, prospect
- Prospect pits
- Strike and dip of inclined bedding
- Main scarp
- Joint - near vertical

0 0.5 1 2 3 4 5 4 Miles

0 0.5 1 2 3 4 5 6 7 8 9 10 Kilometers

Scale 1 : 62,500

Contour Interval - 50 Meters

N

111° 30' 39° 00' — 111° 00' 39° 00'

| | | | |
|---|---|---|---|
| Acord Lakes | Emery West | Emery East | Short Canyon |
| Old Woman Plateau | Walker Flat | Mesa Butte | Big Bend Draw |
| Johns Peak | Willow Springs | Muddy Creek | Ireland Mesa |
| Geyser Peak | Solomons Temple | Salvation Creek | The Frying Pan |

38° 30' 111° 30' — 38° 30' 111° 00'

Research supported by the Utah Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS STATEMAP award numbers 02HQAG0055 and 03HQAG0096. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.